Parallel gateways to pluripotency: open chromatin in stem cells and development.

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Public Summary:
This is a review article where we provide an up-to-date survey of knowledge on the specific organization of the DNA in the nucleus of pluripotent stem cells, which differs from specialized cells and may be important for the differentiation potential of the stem cells.

Scientific Abstract:
Open chromatin is a hallmark of pluripotent stem cells, but the underlying molecular mechanisms are only beginning to be unraveled. In this review we highlight recent studies that employ embryonic stem cells and induced pluripotent stem cells to investigate the regulation of open chromatin and its role in the maintenance and acquisition of pluripotency in vitro. We suggest that findings from in vitro studies using pluripotent stem cells are predictive of in vivo processes of epigenetic regulation of pluripotency, specifically in the development of the zygote and primordial germ cells. The combination of in vitro and in vivo approaches is expected to provide a comprehensive understanding of the epigenetic regulation of pluripotency and reprograming.